

Filling in the: **Good - Agricultural - Practices**

Organisms and Carriers of Pathogens in Food Safety

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Water – Water can carry many organisms such as *Escherichia coli*, *Salmonella* spp., *Vibrio cholerae*, *Shigella* spp., *Cryptosporidium parvum*, *Giardia lamblia*, *Cyclospora cayentanensis*, *Toxoplasma gondii*, and Norwalk and hepatitis A viruses. Just a small amount of these organisms can cause a foodborne illness. Know your water source! Drinking water, such as municipal water, is considered the safest source, but a copy of the municipal water test should be obtained each year. Ground water is better than surface water which may be contaminated anytime during the year. Water is one of the first and last things to come in contact with produce. Make sure the source used is not contaminated from livestock operations, wildlife or sewage treatment facilities. Ground water sources should be sampled at least twice a year to determine if a microbial problem exists. Test surface water more frequently (spring, mid summer and just before harvest) to ensure product safety.

Manure and Municipal Biosolids – These two are potential sources of *Escherichia coli* 0157:H7, *Salmonella*, *Cryptosporidium* and other pathogens. Manure and biosolids including slurries and teas must be managed to ensure produce does not become contaminated. Fresh manure should not be applied just before planting or as a sidedress material. Manure should not be applied within 120 days of fruit and vegetable harvest. This is especially important when planting root and leafy green crops. The manure or biosolids should never come in contact with any horticultural crop. Manure and biosolids are best applied to agronomic or perennial crops that will not be harvested until the end of summer. Slurry stored or composted manure will reduce or kill most pathogens if held for sufficient time. Slurry material should be held for at least 60 days in summer and 90 days in winter. Composted manure if heated to at least 140°F will control microbes. A good rule of thumb - if weed seeds are killed then microbes will be killed.

Worker Hygiene – There are several organisms that can be transmitted through food contaminated by infected employees. Among those are *Hepatitis A*, *Salmonella typhi*, *Shigella species*, *Norwalk* and *Norwalk-like viruses*, *Staphylococcus aureus*, *Streptococcus pyogenes* and *Escherichia coli* 0157:H7. Some past outbreaks of foodborne diseases have been traced to poor worker hygiene. The Occupational Safety and Health Act mandates that growers need to have restroom facilities in the field when working more than ¼ mile from another restroom. The facility must have soap, fresh water and single use towels for hand washing. Having these facilities does not mean they are properly used. One of the biggest maintenance problems with the field restroom is keeping clean water. Some type of automatic shut off will alleviate wasting water. Workers should be trained as to the reason for and proper use of the facilities. Training may be on a one-to-one basis or as a group in the spring at one session

as the season begins. Whether they work in the packingshed or field it must be stressed to workers that good hygiene is imperative. The symptoms most associated with foodborne diseases are fever, diarrhea, vomiting and sometimes a sore throat with fever. Any worker who has these symptoms should not work directly or indirectly with fresh produce. Encourage workers to report the presence of any of these symptoms and assure them they will not be fired or sent home, but will be given other tasks.

Field, facility and transport sanitation – Clean and sanitize all equipment prior to harvest. This includes previously used bins and containers. Once sanitized, place the bins and containers in full sun so the ultraviolet rays can continue to kill pathogens. Make sure all animals are excluded from the packing area. This is a difficult task if the packingshed has large overhead doors, but at least keep the building closed at night so birds do not roost, pets and rodents are excluded. The packingshed should be cleaned and sanitized at the end of each day. Sanitation is critical whether the produce is delivered to a roadside stand, processing plant, or loaded on a truck for shipment. Inspect the truck for cleanliness, odors, obvious dirt or debris. What was on the truck in the previous load could cause cross contamination. Make sure the refrigeration unit is working properly and the field heat removed from the produce before loading. Units on trucks are designed to maintain temperatures not to remove field heat.